increasingly important in a variety of areas such as drug enforcement activities.

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continues to grow daily, primarily because of the proliferation of hand held equipment, the range of which can be greatly extended by mobile relay operations. Mobile relay systems also reduce contention for open channels, since units hear each other and observe priorities as opposed to inadvertently covering up what may be a vital signal from another unit. Further, reuse of channels by separate licensees in a common signal area is enhanced over simplex operation, since mobiles hear one another in a similar fashion.

Unfortunately, there is no established channel pairing in the 150-170 MHz band (which could greatly facilitate mobile relay operation), as exists in other portions of the spectrum. Block allocations are sometimes not large enough to provide necessary separation between transmit and receive frequencies. Intermodulation and desensitization problems at shared sites add to the difficulty in building such systems. Any refarming effort must address this problem.

The lack of prescribed pairing has resulted in mobile relay transmitters being licensed in every portion of the

difficult, but it must be commenced concurrent with other refarming efforts.

The task of designating transmit and receive channels would be greatly facilitated if there could be some exchange of channels between services. This should include public as well as private users. APCO is not in a position to make final recommendations at this time, but offers some general suggestions:

- Investigate the potential and willingness of other services to effect some trading of frequency blocks.
- 2. Study the potential of designating certain portions of a block for mobile relay stations and others for mobile and control. Even if it is impossible to develop standard spacing for all channels, this could aid by grouping transmitters away from receivers. For example, the FCC could place mobile relay stations at both extreme ends of the band and control and mobile in the center portion.

The Commission's proposal would virtually eliminate any potential for mobile relay type operation in this portion of the spectrum. These vital systems (many serving entire states) must be protected, and a plan must be developed to enhance the creation of additional systems and to prevent further assignments that would inhibit such expansion.

E. SPECTRUM REFARMING BELOW 150 MHz

For the most part, the Commission has ignored the frequency bands below 150 MHz. APCO believes, however, that some refarming is necessary and appropriate in these bands, both below and above 72 MHz.

1. Below 72 MHz

In frequencies below 72 MHz, usage has declined because of skip, antenna, and noise problems and the lack of available equipment. However, there are still a great many systems operating at these frequencies, particularly wide area systems such as state police, forestry and highway systems. The development of digital transmission is progressing at a rapid rate and could result in more demand for these channels. These frequencies should not be ignored, and the potential for reducing channel spacing and improving technical standards should be considered. APCO does not have a firm and final recommendation, but this portion of the spectrum is part of the consideration in Project 25, and rules should be flexible enough to accommodate improved spectrum utilization. As in the VHF High Band, a specified channel plan for mobile relay operation is essential, and efforts should be expended to group channels accordingly.

The Commission's proposal to eliminate specific designation of channels for state use only in these channels

is certain to be opposed by state agencies. APCO has many members representing these governmental entities and fully supports their views. The further proposal to eliminate individual service classification and designate the channels as "Public Safety" has some merit, but also some disadvantages. Part 90.176 exempts this portion of the spectrum from interservice sharing, and this has, in some instances, resulted in less than the most effective use of the frequencies.

2. 72 to 76 MHz.

Public Safety entities use channels in the 72-76 MHz band for fixed operational needs in many areas, particularly in mountainous terrain where it is impossible to construct microwave paths. These channels have historically been assigned to all services without coordination, which has resulted in innumerable problems. For example, wide area paging systems have been granted licenses for systems that run almost continuously transmitting page tones. This has forced many users to change channels, often more than once, in the effort to find a usable channels to control a remote base station.

APCO recommends that channel width be changed to 10 kHz by dividing the existing channels in the middle. There will then be 10 pairs of channels, consisting of a block in the 72 MHz region and another in the 76 MHz region to be designated for Public Safety as Fixed Operational. Low

power (2 watt) mobile operation should also be permitted on these channels on a secondary basis. An appropriate number of the remaining channels should be designated for Fixed Operational use for other non-public safety users in a similar fashion. The remaining channels should be designated for low power use only, with a minimum of ten channels for public safety exclusively. Other existing uses, such as model airplane control, should be accommodated with exclusive channels as necessary.

This arrangement would ensure optimum use of the channels for vital fixed operational uses, and facilitate the use of economical hand held and other portable equipment. The frequencies could be further divided as equipment is eventually developed to operate within 5 kHz channels.

F. INTERMODULATION AND DESENSITIZATION ISSUES

The issue of intermodulation and desensitization has apparently been ignored in the Commission's discussion on channel splitting. Yet, there is a current severe problem with both intermodulation and desensitization, particularly in the 150 to 160 MHz band. The prolific use of high level sites, both natural and man made, results in heavy concentrations of RF at these locations. Another problem is that there is no firm channelization plan in VHF for base and mobile or mobile relay as in the UHF portion of the spectrum.

VHF paging systems are permitted to operate at power levels ten or more times that of other stations. Since the services are intermixed and coordinated by many different entities, utilizing dissimilar and/or inadequate data bases, heavily occupied sites become a nightmare.

Lack of planned and organized antenna combining schemes at shared sites is also common. Poorly maintained antenna structures and wire fences abound, creating an untold number of places where signals can be rectified. Many sites also accommodate very high powered commercial FM and television stations, which compounds the problem. The dissimilarity of services and users has resulted in transmitters and receivers operating within a few kilohertz of each other at the same sites with intolerable levels of desensitization.

Significantly, as channels are split and the number of frequencies becomes greater these intermodulation and desensitization problems will increase—not in a linear fashion, but exponentially! Combining devices, cavities and crystal filters are essentially wide band and will not be effective in providing adequate protection at the proposed channel spacings. Any type of amplitude modulation can also increase the potential for interference through rectification of signals and must be a consideration, particularly in metropolitan areas with large numbers of consumer electronic devices, such as television and radio receivers.

The result of all this is to greatly reduce the number of <u>usable</u> channels at any site, or in any geographical area over projections made in the instant Docket. Regardless of the number of channels listed in the Rules and Regulations as authorized, technical reality is the true limiting factor. 2/

III. THE FCC'S PROPOSED HEIGHT/POWER LIMITS WOULD IMPOSE UNDUE BURDENS ON STATE AND LOCAL GOVERNMENT AND DISRUPT PUBLIC SAFETY COMMUNICATIONS.

jurisdiction. 10/ The cost of additional sites would be enormous, and in many regions the additional sites would be unavailable because of land acquisition and increasingly stringent zoning and environmental restrictions. The use of additional sites would also increase the agencies' need for spectrum, since microwave frequencies would be needed to connect their new sites.

APCO believes that this is an area in which special rules for the Public Safety Radio Services are appropriate.

There is a striking difference in the requirements for those



Obviously, the small city described would be entitled to use maximum power if located at a few feet HAAT, while the statewide sustem with stations-located on mountain tons or

safety systems should become subject to the new coverage restrictions when reducing channel bandwidth pursuant to other provisions of the new Part 88 requirements.

IV. CHANGES IN RADIO SERVICE CATEGORIES OR FREQUENCY COORDINATION MUST RESPECT THE SPECIAL NEEDS OF PUBLIC SAFETY.

The Commission offers two alternatives in its Notice for complete or partial consolidation of the 20 Private Land Mobile Radio Services. The FCC's Option 1 would be to consolidate the current services into broad categories, including a Public Safety Radio Service that would replace the current Police, Fire, EMRS, Forestry-Conservation, and Highway Maintenance Radio Services. Under the Commission's Option 1, applications for channels in the new Public Safety Radio Service could be submitted to any of the current public safety frequency coordinators (APCO, FCCA, IAFC/IMSA, and AASHTO). The FCC's Option 2 is to preserve the current categories, but to assign newly created channels (as a result of channel splitting) to a new General Category pool in which any land mobile user would be eligible.

Before addressing the Commission's options, APCO offers the following observations based on its many years of spectrum management experience.

The discrete service blocks for the public safety radio services have had a positive influence on spectrum utilization and in providing each individual service with specific channels to meet their needs.

- 2. However, discrete service blocks have also had some negative effects:
 - a. Interspersing of divergent services within the same public safety blocks has complicated the frequency assignment process.
 - b. Specific service designation has resulted in shortages of channels in some services and surplus channels in others in certain areas, as requirements differ due to geographic and demographic variations.
 - c. Narrow blocks, as in the 150 MHz Fire Radio Service, force applicants to go to other services for channels when developing mobile relay systems due to inadequate channel spacing.
 - d. Confining interservice sharing to frequencies above 150 MHz (90.176) has had a negative impact on low band spectrum utilization.
 - e. Outside of the state police assignments in the 30-50 MHz band where special considerations are given to eliminating "skip interference," the use of multiple coordinators had made it impossible to coordinate subaudible tones in an attempt to

reduce the long distance "skip" interference that is very common in this band.

- 3. Experience with block assignments with multiple coordinators in which all public safety services have equal eligibility, as in the 453/458 MHz public safety blocks, has compounded the frequency coordination process. Delays of weeks or months are often encountered in receiving sign-offs from others, and in some instances, are further complicated by additional fees charged to the applicant for interservice coordination.

 Coordinators do not use a common database, and it is possible for simultaneous requests for a specific channel to be in progress for more than one service.
- 4. APCO presently coordinates the Local Government
 Radio Service and all 420 and 800 MHz public
 safety pool channels which provide eligibility to
 all services. This has been accomplished for many
 years with virtually no complaints. Every
 applicant is treated with equal consideration,
 regardless of the service.
- 5. APCO shares concerns of users of state-only channels and of those who use a group of channels for a wide region or for a full state. These assignments, as well as specifically designated mutual aid channels, must be protected for their

current and projected use, and should be addressed in some fashion in any new rules.

With these observations in mind, APCO will first discuss the FCC's Option 2 (retention of current services) and then its Option 1 (consolidation of services).

A. FCC Option 2: Retain Current Services

The current service blocks have served public safety well, and should not be eliminated. Therefore, APCO would support Option 2, provided, however, that it does not result in any net loss of public safety spectrum to non-public safety users. Any channels created from existing public safety frequencies must remain public safety channels, and

unique needs of the different public safety radio service categories.

APCO is strongly opposed to the concept of multiple, competing frequency coordinators in the proposed Public Safety Radio Service. An example of what would occur with multiple coordinators is the current situation in the 453/458 MHz public safety block where all public safety services have eligibility. Significant delays are encountered in receiving concurrences from other coordinators and there is a lack of common data base, as stated above. Extending this situation to other frequency bands is a recipe for disaster.

APCO stresses that it is not afraid of competition. Indeed, if the Commission's multiple coordinator proposal were adopted, APCO is confident it would end up coordinating an even larger portion of public safety applications than it does already. However, competition in this context would unnecessarily complicate and reduce the effectiveness of the frequency coordination process. Competition also will not lower fees; in reality, it will almost surely cause an increase due to added overhead, particularly if some coordinators insist on receiving a payment for granting concurrences. 12/ In contrast, a single coordinator could

^{12/} APCO notes that it recently <u>reduced</u> its coordination factor and expects to make further reductions in the near

actually provide lower cost service because the economies of scale.

APCO firmly believes that, if the Commission consolidates public safety radio frequencies into a single radio service, it must designate a single public safety coordinator for all of those channels. However, the Commission should also require the single coordinator to adopt procedures to ensure the active participation in the coordination process by organizations representing the special needs of each of the current Public Safety Radio Services. APCO is prepared to accept this responsibility and would work with other public safety organizations to develop such procedures should the Commission select it as the single coordinator. 13/

V. THERE IS A NEED FOR INDUSTRY/USER CONSENSUS.

The proceeding involves many complex engineering issues which cannot be easily resolved in a standard rulemaking proceeding. Therefore, the Commission should turn to and rely upon the expertise of a special committee established

^{13/} The Chief of the Private Radio Bureau has publicly

under its auspices to recommend specific technical parameters for spectrum refarming. The technical committee should include user representatives and equipment manufacturers represented through TIA, and should be encouraged to reach consensus positions on key issues. The Commission staff should oversee the committee and it should be charged with completing its work in as short a time period as possible, not to exceed 12 months.

This suggested approach would assist the Commission by sharing the work load, providing expert technical advice and avoiding controversial decisions through the consensus process. The issues in this proceeding will have a long lasting impact on the future of land mobile radio communications. Therefore, it is imperative that these decisions be carefully considered and conclusions thoughtfully developed. Regardless of the expertise and capability of Commission staff, APCO believes this can best be accomplished through the shared process with users and manufacturers.

CONCLUSION

This proceeding will have a lasting impact on future generations of public safety and other land mobile radio users. Unfortunately, the specific proposal in the Commission's Notice is seriously flawed. However, if the Commission adopts APCO's alternative proposals, it will move in the direction of greater spectrum efficiency while serving the special needs of those radio services that protect the safety of life and property.

Respectfully submitted,

ASSOCIATED PUBLIC-SAFETY COMMUNICATIONS OFFICERS, INC.

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Appendix A Projected Growth

Based on Docket 84-232, Table 18

Radio Service	Proj 1990 Stations	Proj % Growth	% Growth to 10/92*	Proj Stns 10/92
Local Govt	81,200	6.5/yr	11.69	90,695
Police	92,600	6.2/yr	11.14	102,915
Fire	48,700	6.1/yr	10.95	54,035
Highway Maint	19,900	5.5/yr	9.85	21,860
Forestry Cons	13,900	6.7/yr	12.06	15,575
Total	250,700			285,080

^{*}Projected "Annual Growth Rate" computed using annual compounding for 1.75 years (December 31, 1990, through September 23, 1992)

Table 2
Actual vs. Projected Growth

Radio Service	Act VHF Lo	ual Public VHF Hi	Safety Ba	and Licens UHF-TV	es** Total	Diff vs Table 1
Local Govt	8,640	46,551	21,407	3,036	79,634	-11,061
Police	16,215	44,322	19,148	30,391	110,076	+ 7,161
Fire	13,270	34,704	5,401	3,698	57,073	+ 3,038
Highway Maint	13,108	20,864	1,709	7	35,688	+13,828
Forestry Cons	8,483	42,447	635	0	51,565	+35,590

800 MHz Stations Not Included Above

800 MHz Band	Conventional**	Trunked**	Total
806-821/851-866	7,817/4,335	84,920/9,083	106,155
821-824/866-869 National Plan	1,122/ 496	35,450/6,165	43,233
Total	8,939/4,831	120,370/15,248	149,388
Total, All Bands			483,424

^{**} Number of transmitters from FCC license data base on 09/23/92; this count includes all stations of class Fnn (FB, FBn, FXn, etc).